1 History of Photography

After studying this chapter you will be able to:

- Describe early attempts to produce photographic images.
- Name important inventors and the inventions which led to the present technological development of photography.
- Trace the development of film and cameras from the 1500s to the present.

Photography took several hundred years to reach its present state. No one person can be credited with its invention. As inventors worked on new processes and improvements in equipment, there were many failures. Most failed because the new techniques were too complex, required great skill, or produced results that were not clear and/or permanent.

CAMERA OBSCURA

The principle of the camera was known before other photographic processes were discovered. The CAMERA OBSCURA (dark chamber), Fig. 1-1, appeared in Europe in the early 1500s. (The Chinese knew of it as early as the fourth century.)

The first camera obscura was a darkened room with a convex lens inserted in one wall. (Convex means curved outward like the outside of a circle.) The image or scene outside the wall passed through the lens and was projected (pictured) on the opposite wall in full color. However, the image was smaller and turned upside down.

The camera obscura made it easy for anyone to sketch scenes. No artistic talent was needed. A sheet of paper was placed where the image appeared. The

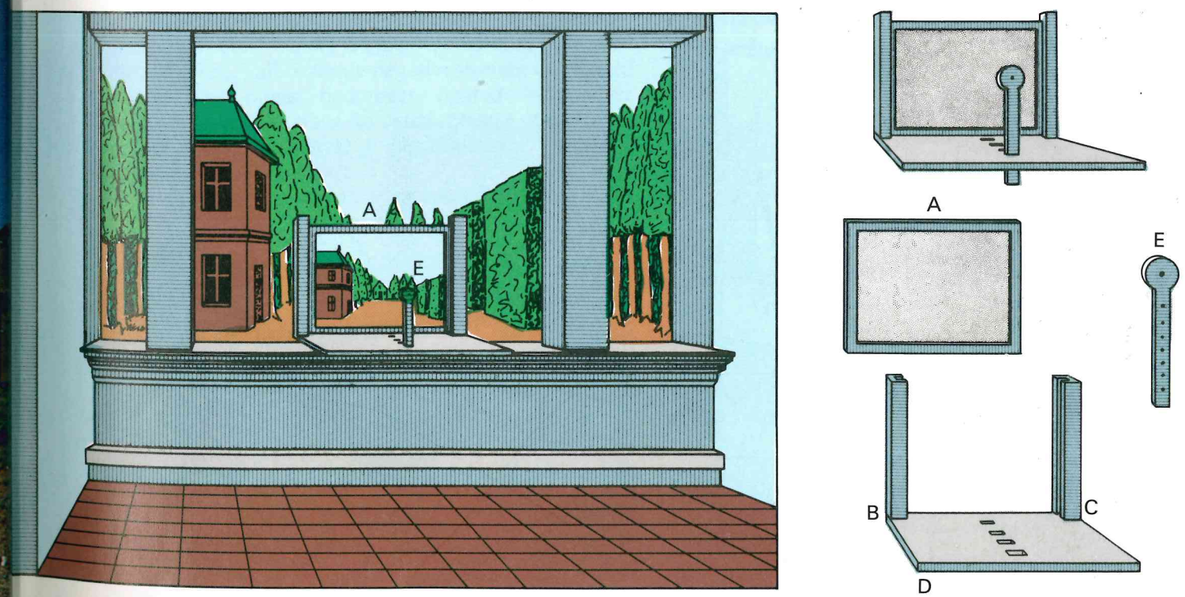

Fig. 1-1. This drawing, made from an old engraving, shows a variation of the camera obscura. This early nonphotographic camera used a glass plate (A) that fit between supports (B and C). A movable sighting device (E) was fitted into the base (D). The artist traced the outline of the scene on the glass plate. Unlike the methods that used a lens to project an image, this device showed the image right-side-up.

scene could be traced and the colors filled in.

By the 1660s, the camera obscura had shrunk to the size of a portable box. A mirror reflected the image onto a horizontal ground glass surface, Fig. 1-2.

FIRST PHOTOGRAPHIC DISCOVERY

The first breakthrough in light-sensitive material came in 1725. A German physicist, Johann Schulze, found that when certain silver salts were exposed to light they changed color. He placed a mixture of chalk and silver in a clear glass container. (The mixture had been dissolved in nitric acid.) Wherever light struck the liquid mixture it caused it to change from white to dark purple. He could "print" letters and shapes by attaching paper stencils to the outside of the container. The images were not permanent. They broke up when the liquid was disturbed.

IMAGE ON A LIGHT-SENSITIVE SURFACE

Joseph Niepce, a Frenchman, was one of the first experimenters in photography. He attempted to produce an image on a light-sensitive material. In 1816, he made a negative image in a camera like the basic camera obscura. The image appeared on paper after it was soaked in silver chloride. This is a light-sensitive silver salt. However, the image was very faint and did not last.

Then Niepce found that bitumen of Judea (a kind of asphalt), when dissolved in a solvent, made a varnish that was sensitive to light. In 1826, using this special varnish, he produced a very faint image on a polished metal plate.

A thin coating of the varnish-like material was spread over the plate. It was then exposed in a modified camera obscura. Exposure time was eight hours. It is credited with being the world's first photograph.

FIRST PRACTICAL PHOTOGRAPH

A co-worker of Niepce, Louis Daguerre, in 1835, discovered that a highly polished silver sheet could be made light-sensitive if exposed to iodine vapor. When an exposure was made in a camera obscura, however, no image appeared.

He later discovered accidentally that the image was latent. (Latent means the image is there but is not yet visible.) It was made to appear by heating the sheet with the fumes of hot mercury. This "developing" process greatly magnified the silver iodide's sensitivity to light.

He found that the image could be made permanent by removing the remaining light-sensitive particles. (If left, they would eventually darken and destroy the image.) The particles were removed or "fixed" with a hot salt solution.

Daguerre patented his idea in 1839. This process resulted in photographs called "daguerreotypes,"Fig. 1-3. This was the first practical photographic process. It proved to be very expensive and complicated. Fig. 1-4 shows a camera of that time. It was a simple box with a hand-operated flap for a shutter. Figs. 1-5 and 1-6 show other equipment needed for making daguerreotype prints. In spite of its disadvantages, the process was popular until the mid-1870s.

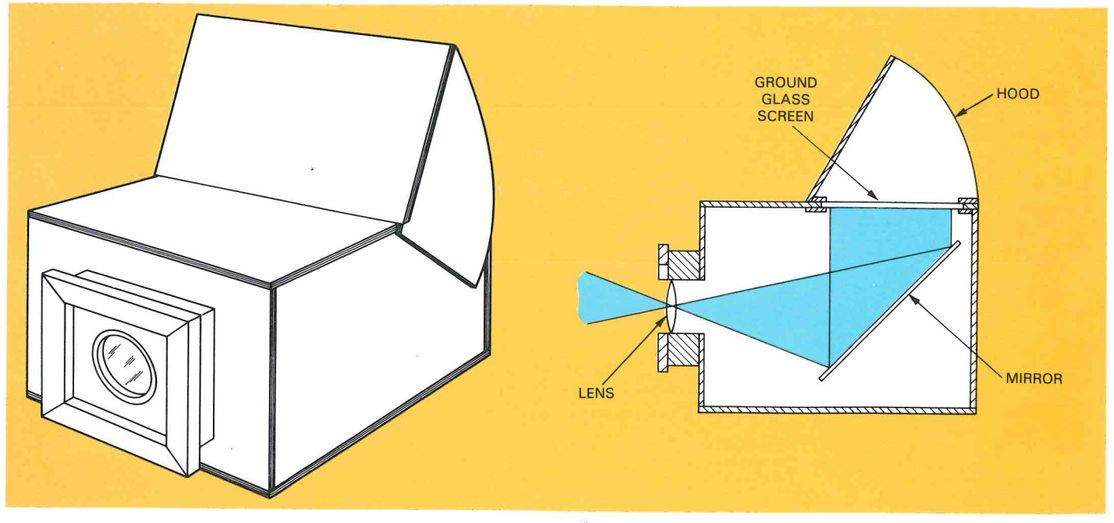

Fig. 1-2. Portable camera obscura of the 1660s had shrunk to the size of a small box. Image was traced on a thin sheet of paper over the ground glass.

Fig. 1-3. Earliest photographs were printed on metal plates called "daguerreotypes" after the inventor. This photograph, called the "Lepidopterist," was taken around 1850. (Div. of Photographic History, Smithsonian Institution)

THE PRINT COMES OF AGE

William Fox Talbot of England was also working, in 1835, on what he hoped would be a practical photographic process. Unlike Daguerre, who used sensitized metal plates, Talbot made negative images on treated paper. The paper had been coated with silver chloride. This is close to what Niepce had done. Talbot, however, made a positive print from the paper negative.

The paper negative was waxed to make it

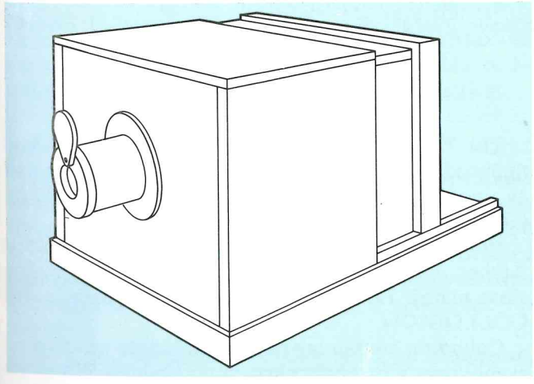

Fig. 1-4. Daguerreotype camera of the mid-1850s used a simple flap arrangement for a shutter.

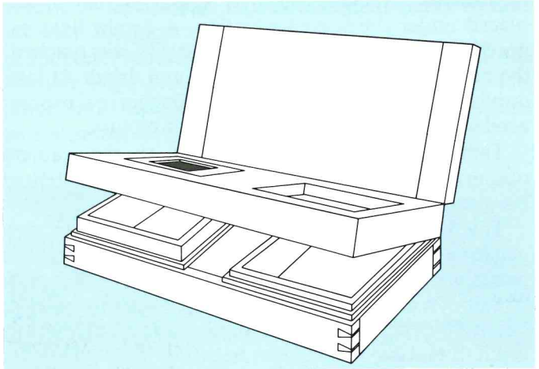

Fig. 1-5. Double sensitizing box for daguerreotype process. A highly polished silver plate was made light-sensitive by being exposed to iodine vapor in the box.

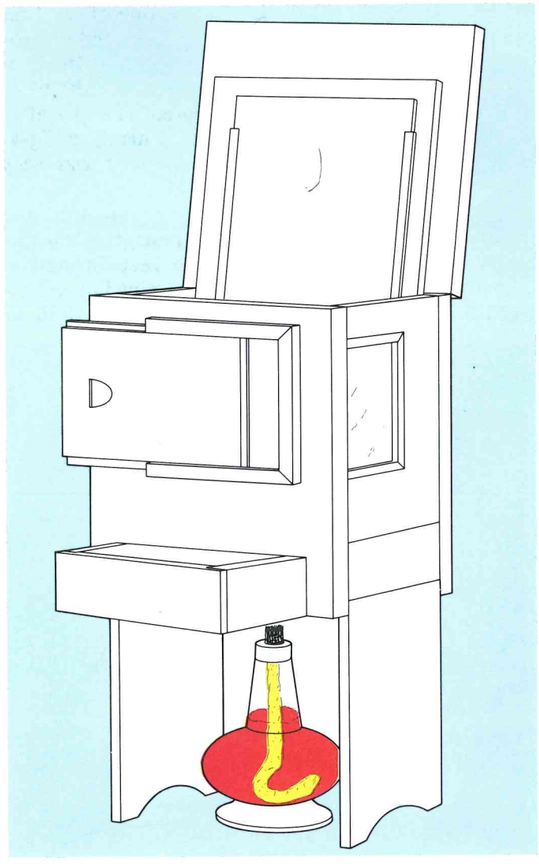

Fig. 1-6. Mercury vapor box for developing daguerreotypes. The latent image on the exposed silver plate was made to appear by treating the sheet with the fumes of heated mercury. The picture was then fixed with a hot salt solution.

translucent. Another sheet of sensitized paper was placed under the waxed negative. A bright light exposed the paper. When the right density was reached, the paper print was fixed, washed, and dried. At last, duplicate prints could be made. Daguerre's process needed a separate exposure for each picture.

Talbot used a special version of the camera obscura, Fig. 1-7, to make his negatives. He patented the process in 1841.

This technique of making a positive print from a negative is the basis of modern photography. The prints were called Calotypes or Talbotypes, Fig. 1-8.

Talbot's process did not produce prints as good as daguerreotypes. The lower quality was caused by the grain or texture of the paper negative. This defect was transmitted to the print.

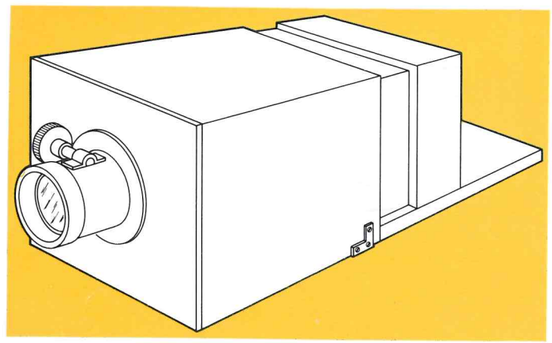

Fig. 1-7. Type of camera used by Talbot from 1835 to 1840. It produced a paper negative.

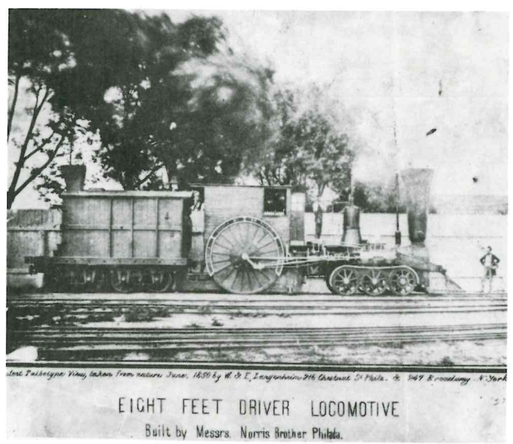

Fig. 1-8. This photograph was produced in 1850 using a Calotype paper negative. Compared with the daguerreotype of metal shown in Fig. 1-3, it is very poor quality indeed. (Div. of Photographic History, Smithsonian Institution)

NEW LENSES AND CAMERAS

As photographic processes improved, so did the lens and camera design. Lenses with up to four elements were made. They transmitted up to 16 times more light to the film than the simple lenses used in the first cameras. The increased light made shorter exposures (less than 60 seconds) possible. Portrait photography became popular.

Cameras, Fig. 1-9, were more precise and smaller than the early modified (changed) or redesigned camera obscuras.

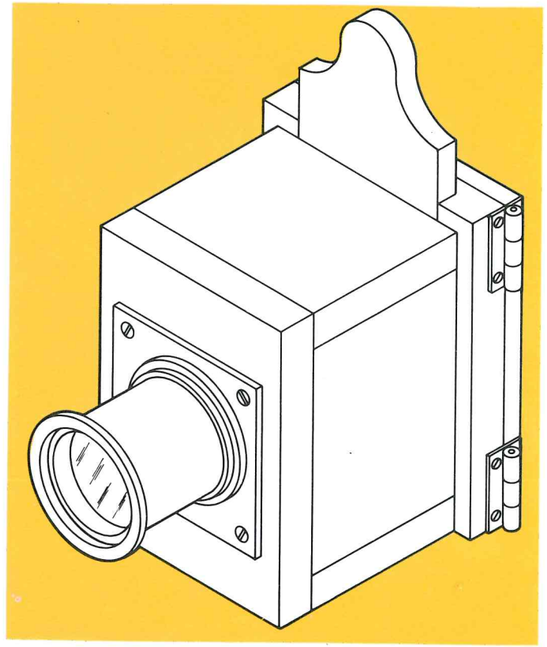

Fig. 1-9. Improved camera used to make Talbotypes. Lens was focused by moving it in or out. The back opened to allow loading of sensitized paper (negative). Exposure was made by withdrawing a wooden "shutter."

WET PLATE PHOTOGRAPHY

The Talbot negative-to-positive print process had many advantages over the daguerreotype. Using paper as a negative, however, greatly reduced print quality. Glass was next tried as a negative base.

In 1851, another Englishman, Frederick Scott Archer, discovered the first practical means of coating glass plates. He used a plastic-like substance called COLLODION.

Collodion containing potassium iodide was flowed evenly over a carefully cleaned glass plate. When the collodion had dried to a "tacky" state, a bath in silver nitrate sensitized it to light.

The wet plate was loaded into the camera and exposed immediately. Exposed plates also had to be developed, fixed, and washed immediately. If the collodion dried before the sequence was completed, it became water-resistant and could not be developed.

This was called the WET COLLODION process. Because the plates had to be exposed and developed while still wet, photographers had to take their darkrooms along when they made pictures, Fig. 1-10.

Glass negatives produced high quality prints because they could record fine details and register slight differences in tones.

TINTYPES

A variation of the wet collodion process produced a direct positive on a metal (tinplate) base. They were called "tintypes" or ferrotypes. This technique was used by itinerant (traveling) photographers who brought photography to the amateur.

DRY-PLATE PHOTOGRAPHY

One of photography's greatest advancements came in 1871. A British physician, Richard L. Maddox, made the first successful dry-plate negative. He replaced the "wet" collodion coat with a thin coating of gelatin and silver nitrate. After drying, the plate retained its sensitivity to light for some time.

The dry-plate negative changed photography forever. The plate taken could be developed anytime after exposure. Photographs could be taken almost anywhere. A cumbersome, portable darkroom was no longer needed.

This advancement made the commercial manufacture of photographic plates possible. It was found, by accident, that heating the plates to dry the gelatin greatly increased their sensitivity to light. Exposure times were further reduced.

FIRST COLOR PHOTOGRAPHY

Photographers and experimenters were still trying to copy nature in full color. In 1861, James Maxwell demonstrated the first color photographs. His technique, while it produced color, was not practical.

ROLL FILM INTRODUCED

The photographic industry started to grow rapidly in the 1880s. It was then that flexible roll film was introduced. The light-sensitive gelatin was coated on a paper backing that protected it from unwanted light. After developing, the gelatin was stripped from the paper backing and attached to a glass plate for printing.

In 1888, using film of this type, an American, George Eastman, introduced a 100-shot box camera, Fig. 1-11. The camera and film were returned to Eastman for processing. Along with the prints, he returned the camera. It was reloaded, ready to take another 100 pictures.

Eastman launched the sale of the camera with the slogan, "You press the button, we do the rest." The trademark, Kodak, was introduced at the same time as the camera.

Fig. 1-10. Photographers using the wet collodion process had to take their darkrooms wherever they took pictures. Typical darkroom was mounted on a horse drawn wagon. (Div. of Photographic History, Smithsonian Institution)

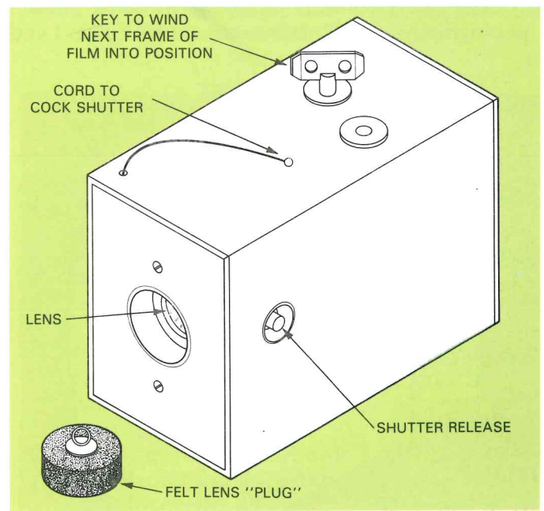

Fig. 1-11. The Eastman 100-shot box camera of 1888. After exposure, the camera and film were sent to Eastman for processing. It was returned with the prints, ready to take another 100 pictures.

In 1889, Eastman replaced the paper backing with a clear, flexible celluloid film. Prints were easier to make because the gelatin did not have to be stripped from the backing to make the print. Processing kits made it possible to develop the film at home.

This camera made photography popular. Anyone could take a picture. To encourage children in the hobby, Eastman brought out the first Kodak "Brownie" camera in 1900, Fig. 1-12.

The pocket camera is not a new idea. Eastman produced several in the late 1800s. The folding pocket camera, Fig. 1-13, remained in use for more than 60 years.

MAJOR ADVANCEMENTS

Movie film was introduced before the turn of the century. Thomas Edison used the new flexible plastic film in his 1891 invention of the motion picture.

Commercial color film became available in 1907. This film, French Autochrome, was followed by other color films. In the mid-1930s, Kodak introduced a color film. This film made it possible for the amateur photographer to take color pictures at a reasonable price.

During the early 1900s, film and camera design improved. So did process and printing techniques. Accurate shutters with timing mechanisms became available.

The flashbulb was invented in the 1930s and the electronic flash unit followed close behind. Until that time, the photographer had to "fire" highly flammable magnesium powder to take "flash" pictures.

Later developments include Polaroid instant photography in 1947. It was created by Edwin Land.

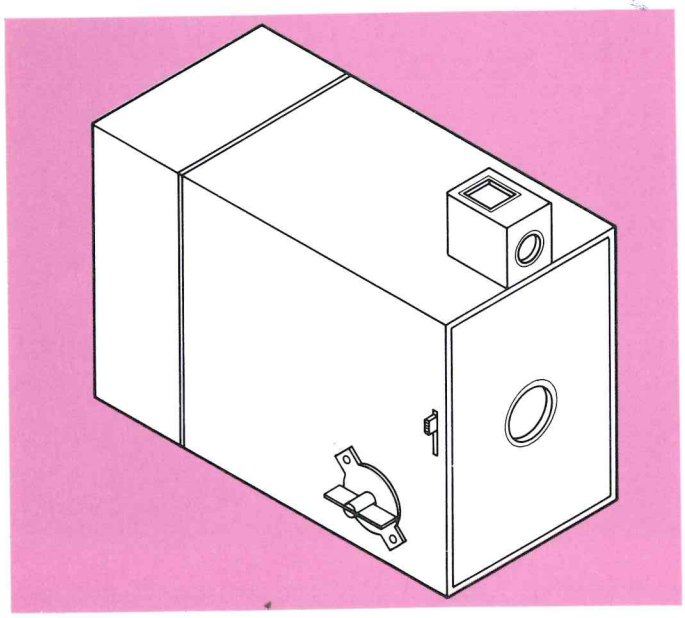

Fig. 1-12. First Kodak Brownie camera. Introduced in 1900, it used film made from clear, flexible celluloid.

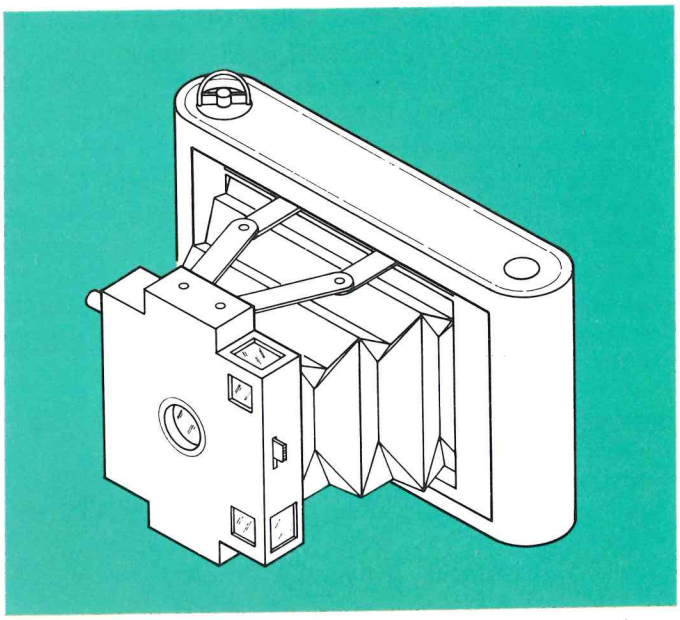

Fig. 1-13. The folding pocket camera, also introduced in the late 1890s remained in use for more than 60 years.

The process could produce a finished black and white print in 60 seconds. In 1963, Land introduced instant color film. It allowed color photographs to be viewed only seconds after they were taken.

In addition to advances in traditional photography, the refinements of electronic photography during the 1980s and 1990s resulted in equipment that could produce both still and motion images of good quality. The convenience and instant playback capability of the portable video recorder (camcorder) has almost completely eliminated use of traditional film-based motion pictures by amateurs. Electronic still images captured by the Hubble Space Telescope provide detailed views of planets and even distant galaxies. See Fig. 1-14.

Cameras for amateur photographers are completely automatic, Fig. 1-15. The camera need only be aimed. A tiny computer in the camera measures the light, sets the aperture and shutter speed, and focuses the camera an instant after the shutter is tripped. If there is not enough light, it will automatically trigger an electronic flash unit.

Film quality and sensitivity to light have improved through the years. Both black and white films and color films have been refined from ISO 12 speed in the early days (not very sensitive to light) to ISO 1000 speeds and higher today (very sensitive to light), Fig. 1-16. Color film and prints can now be processed at home almost as easily as black and white film.

WORDS TO KNOW

Bitumen, Calotypes, camera obscura, collodion, daguerreotype, ferrotypes, image, latent image, Polaroid photography, positive print, Talbotype, tintype, wet collodion process.